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10/585,707	07/10/2006	Minoru Umemoto	KANEKO.014AUS	4346

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EXAMINER

KESSLER, CHRISTOPHER S

ART UNIT	PAPER NUMBER
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1793

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,707	Applicant(s) UMEMOTO ET AL.	
	Examiner CHRISTOPHER KESSLER	Art Unit 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 November 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-23 and 38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-23 and 38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>7/7/09; 3/3/08; 1/3/07; 7/10/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

1. Responsive to the amendment filed 2 November 2009, claims 24-37 and 39 are cancelled. Claims 16-23 and 38 are currently under examination.

Election/Restrictions

2. Applicant's election of group I, claims 16-23 and 38 in the reply filed on 2 November 2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 16-18 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 5,881,594 issued to Hughes et al. (hereinafter "Hughes").

Regarding claim 16, Hughes teaches the invention as claimed. Hughes teaches a method of modifying the surface of a metallic material (see cols. 3-4). Hughes teaches that the method includes a step of mechanically deforming a surface of the workpiece using a sliding tool (see cols. 4-5), thus meeting the limitation of "performing

Art Unit: 1793

a machining operation using a machining tool." Hughes teaches that the machining operation imparts a large local strain on surface of the workpiece (see cols. 4-5 and col. 7 and Fig. 4). Hughes teaches that the strain is plastic (see cols. 4-5 and col. 7 and Fig. 4). Hughes teaches that the local strain is greater than 1 true engineering strain (see Fig. 4 and col. 7). Hughes teaches that the machining operation forms a crystal layer in the workpiece (see col. 7 and Figs. 3-6). Hughes teaches that the crystals in the layer become increasingly finer as the depth from the surface decreases (see col. 7 and Figs. 3-6). Hughes teaches that the layer comprises ultrafine grains (see col. 7 and Figs. 3-6), thus meeting the limitation of an ultrafine crystal layer forming process, and an ultrafine crystal layer formed in a surface layer portion that defines the machined surface.

Regarding claim 17, Hughes envisions that the method can be applied to steel materials (see col. 4 or claims 8 and 17). Hughes does not explicitly state that the machined surface of the workpiece is held lower than A_{c1} . However, Hughes states that the process may take place at room temperature (see claims 8 and 9). Thus this feature would have been an inherent feature in the process as claimed.

Regarding claim 18, Hughes envisions that the method can be applied to non-steel materials (see col. 4 or claims 8 and 17). Hughes does not explicitly state that the machined surface of the workpiece is held lower than substantially half a melting point. However, Hughes states that the process may take place at room temperature (see claims 8 and 9). Thus this feature would have been an inherent feature in the process as claimed.

Art Unit: 1793

Regarding claim 38, Hughes envisions that the workpiece or tool is moved relative to the other, causing the surface to be machined, and that rotational motion is used (see cols. 5-6).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 16, 19-23 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3,117,042 issued to Blechner (hereinafter "Blechner").

Regarding claim 16, Blechner teaches the invention substantially as claimed. Blechner teaches a method of heat treating metals (see col. 1). Blechner teaches performing a machining operation on the surface of the workpiece using a machining tool (see cols. 3-4). Blechner teaches that the method can be used in order to generate a plastic deformation in the workpiece (see col. 4). Blechner teaches that the method forms a crystal layer on the workpiece (see col. 4).

Blechner does not teach wherein the crystal layer is an ultrafine crystal layer. Blechner does not teach that a large local strain in the part induced by the process is equal to 1 true engineering strain.

Blechner teaches that the layer is variable in its thickness by varying the machining parameters (see cols. 2-3 and col. 4). Blechner teaches that the thickness of

Art Unit: 1793

the crystal layer may be 0.001 mm or less (see col. 4). Thus, the range of possible size of the crystals in the layer would have fallen within the range as claimed (Ultrafine), establishing a prima facie case of obviousness. It would have been obvious to one of ordinary skill in the art at time of invention to have created ultrafine crystals in the layer of Blechner because Blechner teaches that the total thickness of the layer is 0.001 mm or less (see col. 4).

Blechner does not describe the measure of plastic deformation present in the workpiece. Blechner only describes that if the parameters are increased (such as pressure), plastic deformation will result (see col. 6). The amount of pressure to be used, and thus the resulting strain (plastic deformation amount) are not taught. However, the similar process would have resulted in the similar results as claimed. Applicant is further directed to MPEP 2112.01. In the alternative, it would have been obvious to one of ordinary skill in the art at time of invention to have optimized the deformation of the workpiece because Blechner teaches that the working parameters (such as pressure) are easily adjusted by one of ordinary skill in the art in order to achieve the desired parameters of thickness depth, hardness, shape, etc. in the work (see cols. 2-3 and col. 4).

Regarding claim 19, Blechner teaches that the steel is heated to above Ac1 (see cols. 2-3, col. 4, Examples).

Regarding claim 20, Blechner teaches that the material may be a nonsteel material which is heated to the melting point (see claim). A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but

Art Unit: 1793

are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985). In the instant case, the condition of heating to the melting point is close enough to the claimed range of lower than the melting point that one of ordinary skill in the art would have expected to processes to have the same properties.

Applicant is further directed to MPEP 2144.05.

In the alternative, Blechner teaches that the method applies to materials which are not steel, but to which apply the common principles of heat treating steel (see col. 2). Thus, it would have been obvious to one of ordinary skill in the art at time of invention to have substituted a non-steel nickel or cobalt material for the steel.

Regarding claim 21, Blechner teaches that the machined surface is cooled after the machining has been performed (see col. 1). Blechner teaches that the cooling rate is high enough to retain an austenitic structure (see col. 1), thus meeting the limitation of higher than a cooling rate that is required for hardening.

Regarding claim 22, Blechner does not teach that a non-ultrafine layer is created by holding the material at 500° C for a time not larger than one second, or wherein the hardness of that layer is 80% as high as the substrate, or wherein that layer is beneath the ultrafine layer.

Blechner teaches that the heat treating temperature is above Ac1 (see col. 1). Thus, the surface layer of Blechner is inherently heated to well above 500° C in the process. The heating of the layer below the surface would have been inherent in the process, due to the conduction of heat into the bulk of the material. For example,

Art Unit: 1793

Blechner teaches that the heat is dissipated throughout the workpiece (see col. 2).

Thus, a layer of material below the surface would have been heated to a temperature as claimed.

Blechner teaches that the treatment time is a results-effective variable (see col. 2). Thus the optimization of the heating time would have been obvious to one of ordinary skill in the art through routine investigation. Applicant is further directed to MPEP 2144.05.

Regarding the limitation wherein the hardness of that layer is 80% as high as the substrate, or wherein that layer is beneath the ultrafine layer, this feature would have been inherent in the method of Blechner, because the similar material, processed similarly, must inherently have the same properties as claimed. Applicant is further directed to MPEP 2112.01.

Regarding claim 23, Blechner is applied to the claims as stated above.

Regarding claim 28, Blechner teaches that the tool and/or workpiece are moved relative to one another, and that the relative motion is in the form of rotation (see cols. 3-4 and Examples 1-7).

Conclusion

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to CHRISTOPHER KESSLER whose telephone number is (571)272-6510. The examiner can normally be reached on Mon-Fri, 9-5.

Art Unit: 1793

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art
Unit 1793

csk